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AN INVESTIGATION OF THE ROLE OF DEPENDENCY IN PREDICTING CONTINUANCE INTENTION TO USE UBIQUITOUS MEDIA SYSTEMS: COMBINING A MEDIA SYTEM PERSPECTIVE WITH EXPECTATION-CONFIRMATION THEORIES

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AN INVESTIGATION OF THE ROLE OF DEPENDENCY IN PREDICTING CONTINUANCE INTENTION TO USE UBIQUITOUS MEDIA SYSTEMS: COMBINING A MEDIA SYSTEM PERSPECTIVE WITH EXPECTATION-CONFIRMATION THEORIES

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Abstract

The mobile telecommunications landscape has evolved into a highly competitive and complex ecosystem composed of network operators, mobile device manufacturers as well as software, content and service providers. This major shift has strongly impacted the fundamental nature of mobile devices which have now become complex multi-purpose, multi-context ubiquitous media systems. Such change has engendered an urgent need to revisit our understanding of mobile device usage through the lens of theories that encompass the multifaceted nature of ubiquitous systems. Relying on a media perspective, the paper investigates the role of individual media dependency in predicting continuance intention to use ubiquitous media systems. Data collected from 150 smartphone users were used to test the developed conceptual model. The results confirmed the overall effect of ubiquitous media systems dependency on individuals' reasoned continuance usage decision. The findings suggest that the level of dependency towards a ubiquitous media system inflates the perceived positive attributes about the system: perceived usefulness and perceived ease of use, as well as the cognitive appraisal about the discrepancies between initial expectations and post-use performance. Theoretical and practical implications developed from these findings are then discussed.

Keywords: media system dependency theory, user behavior, continuance usage, mobile technologies.

1 Introduction

The past decade has been marked by an immense change in the mobile telecommunications arena (Scornavacca et al., 2006; Yuan et al 2010). It has moved from a traditional telephony industry model to a highly competitive and complex ecosystem composed of network operators, mobile device manufacturers as well as software, content and service providers (Chen et al., 2012; Sorensen, 2011).

The extinction of the mobile phone and emergence of the smartphone not only signals a change of how mobile devices are categorized, but it also represents a remarkable shift in the fundamental nature

of this type of technology – from phones that eventually supported data services, to complex multi-purpose, multi-context *ubiquitous media systems* that encapsulate various functions and provide fluid information access across a variety of channels and devices (Lin et al., 2012; Matei et al., 2010). In addition, the proliferation of tablets as well as the wide adoption of multi-device platforms such as iOS, Android and Windows 8 are blurring the traditional division between stationary and mobile information systems (Mallat et al., 2009; Nielsen, 2013; Sorensen, 2011; Stafford et al., 2010). As information access becomes fully ubiquitous and the utilitarian as well as hedonic functionalities of those devices increase, users become more dependent on the affordances provided by this fluid techno-ecosystem (Sorensen, 2011; Turel et al., 2011). As a result, there is a need to understand the role that dependency plays on user behavior in ubiquitous ecosystems (Stafford et al., 2010; Turel et al., 2011).

Media System Dependency (MSD) theory offers a path to explore user dependency in regards to ubiquitous media systems (Ball-Rokeach and DeFleur, 1976; Ball-Rokeach, 1985; Ball-Rokeach 1998). Specifically, the micro-level of MSD theory, known as Individual Media Dependency (IMD) theory provides a robust foundation to assess an individual's dependency relations with regard to a specific media (Grant et al., 1991; Loges, 1994). While MSD theory is quite diffused in the field of mass communication research, it has attracted quite limited attention from the Information Systems discipline (Ball-Rokeach, 1998, Schneberger, 2013; Stafford et al., 2010).

The literature also provides some indication that technology dependency can influence individual's reasoned IT usage decisions (Stafford et al., 2010; Turel et al., 2011). As a result, in a world where more than 80% of the population uses a mobile device (Nielsen, 2013), it seems relevant to investigate the effects of dependency on the continuance intention to use ubiquitous media systems (Bhattacherjee, 2001). In addition, assuming the dual nature that characterizes multimedia devices: IT artifact and multi-media, it seems that incorporating an Individual Media Dependency view within a model derived from Expectation-Confirmation theory (Oliver, 1980) provides a more encompassing approach to investigate continuance use of ubiquitous media systems.

This paper aims at shedding some light into the role of individual media dependency in predicting continuance intention to use ubiquitous media systems. In order to achieve this goal, it develops and validates a research model that combines Media System Dependence theory (Ball-Rokeach, 1998; Ball-Rokeach, 1985; DeFleur and Ball-Rokeach, 1989) with the IS continuance model (Bhattacherjee, 2001).

In the next section the theoretical background is provided. This is followed by the presentation of the proposed model and hypotheses. Then, research methodology, data analysis and results are presented. The papers wraps-up with conclusion and recommendations for future research.

2 Literature review and theoretical background

This section aims at providing a theoretical background on the two key bodies of literature in which this research was anchored - Individual Media System Dependency and Information Systems continuance.

2.1 Individual Media System Dependency

In the past, Media System Dependency (MSD) theory has been used to investigate dependency relationships through mass communication channels such as television (Grant et al., 1991; Nossek and Adoni, 1996; Skumanich and Kintsfather, 1998), or radio and newspapers (Loges, 1994; Loges and Ball-Rokeach, 1993). During the last ten years, some studies have revisited MSD in relation to the use of the Internet (Jung et al., 2001; Leung, 2009; Lyu, 2012; Patwardhan and Yang, 2003). More recently, it has been used to investigate dependency relationships with IT healthcare services (Lakshmi

and Rajaram, 2012), and mobile technology (Stafford et al., 2010). MSD theory defines dependency as a "relation between individuals' goals and the extent to which these goals are contingent upon the resources of the media system [in which] those resources have the capacities to create and gather, process and disseminate information" (Ball-Rokeach, 1993). Hence, dependency relations are goal-oriented, while the scope and intensity of the goals directly impact the strength of the dependency relationships between the user and the media (Ball-Rokeach, 1998; Jung et al., 2012).

As indicated in the introduction, Individual Media Dependency (IMD) theory derives from MSD theory and provides some concrete means to assess individual-level dependency relations with regard to a specific media (Grant et al., 1991; Loges, 1994). In accordance with use and gratification research (Katz et al., 1973), IMD theory assumes that the extent to which a media is capable of fulfilling a person's needs and expectations, will stimulate dependency relations with the media per se which, in turn, impacts on usage patterns and media selection (Grant et al., 1991; Loges, 1994). This research relies on the same assumption in regards to *ubiquitous media systems* – a dependency relation between a person and a ubiquitous media system develops proportionally to the extent this system is able to fulfill this person's needs and expectations; in turn, the level of dependency influences the extent to which this individual will use such technology. In line with IMD theory, this research project defines ubiquitous media system dependency as *the extent to which an individual's capacity to reach his or her objectives depends on the use of his/her ubiquitous media system* (Ball-Rokeach et al., 1984; Ball-Rokeach, 1985; Grant et al., 1991).

According to IMD theory, there are six levels of dependency relations between an individual and a media system (Alcañiz et al. 2006; Ball-Rokeach, 1985; Grant et al., 1991). As shown in Table 1, these levels can be represented as the product of three distinct goals: *understanding*, *orientation*, and *play*; and two different goal targets: *personal* and *social*. *Understanding* refers to the need of individuals to have a basic understanding of themselves, and to understand the social environment (including the perception of everyone's role in society). *Orientation* relates to the need to make a behavioral decision, and to have guidance for interacting well with other people. *Play* pertains to the capacity of the media to provide mechanisms for relaxing and releasing stress when individuals are alone or accompanied by others.

	Understanding	**Orientation**	**Play**
Personal	*Self-understanding:* basic understanding of themselves	*Interaction orientation:* to make a behavioral decisions	*Solitary play:* for relaxing and releasing stress when individuals are alone
Social	*Social understanding:* understanding of social environment	*Action orientation:* to have a guidance for interacting correctly with other people	*Social play:* for relaxing and releasing stress together other people

Table 1: Typology of Individuals' Media System Dependencies (adapted from Ball-Rokeach, 1985)

A stream of research has used the term "technological addiction" referring to particular emotion-related psychological states that cause behaviors such as obsessive-compulsive use of technology (Bianchi and Phillips, 2005; Block, 2008; Byun et al., 2009). Turel et al. (2011) defines it as a psychological state of maladaptive dependency on the use of a technology engendering typical behavioral addiction symptoms such as salience, withdrawal and conflict. The authors argue that a user's level of addiction influences the reasoned IT usage decisions of this individual by "distorting various systems' perceptions" (p. 1044). While this research focuses on the more pragmatic, goal-oriented facet of dependency, it strongly echoes this stream of research as it addresses dependency relations towards the use of technology.

The next section provides a brief background on Expectation-Confirmation and IS continuance models.

2.2 Expectation-Confirmation and IS continuance models

Adoption and use of new technology is often described as one of the most mature research areas within the information systems discipline (Benbasat and Barki, 2007; Venkatesh et al., 2003; Venkatesh et al., 2011). While one stream of research focused on the adoption of IS (e.g. Davis et al., 1989), some other IS scholars were interested in the individuals' continuing use of Information Technology after initial adoption (Bhattacherjee, 2001). Some of the pioneering IS studies on continuance phenomenon include the notion of "implementation" (Zmud, 1982), "incorporation" (Kwon and Zmud, 1987), and "routinization" (Cooper and Zmud, 1990).

Bhattacherjee (2001) developed the IS continuance model based on Expectation-Confirmation theory (ECT) (Oliver, 1980) which has gained widespread acceptance in explaining consumer satisfaction and repurchase intention (see Oliver, 1993). As presented in Figure 1, ECT posits that a consumer's repurchase intention towards a product/service is determined by the person's level of satisfaction. In turn, two factors determine consumer satisfaction: initial expectations (pre-purchase expectations) about the product/service, and the discrepancy between initial expectations and perceived product/service performance (confirmation).

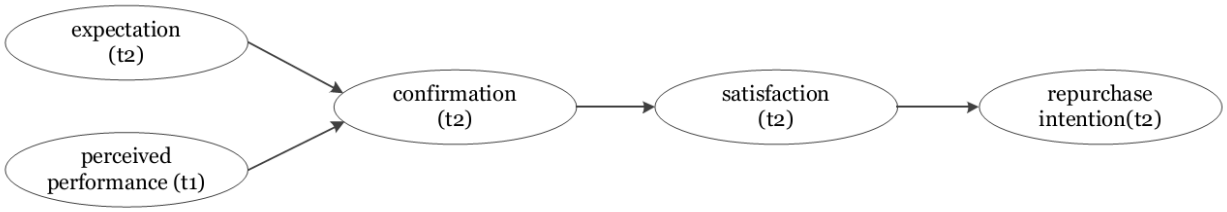

Figure 1. Expectation-confirmation model (Oliver 1980)

According to the IS continuance model, the congruence between initial expectations and actual performance (confirmation) affects both perceived usefulness (embodying expectations) and user satisfaction. In line with ECT, perceived usefulness impacts satisfaction which in turn determines continuance intention (see Figure 2).

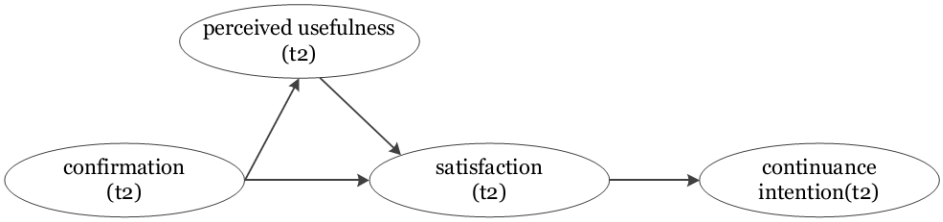

Figure 2. IS continuance model (Bhattacherjee 2001)

With the purpose of gaining insights on how the IS continuance model had been previously used, a rigorous search was conducted in the AIS "basket of eight". A total of 61 articles citing Bhattacherjee (2001) were identified. These were then classified and reviewed according to the nature and type of contribution.

A first bulk of studies including Briggs et al. (2008), Compeau et al. (2007), Ruth (2011), and Van Slyke et al. (2007) used general findings/implications from Bhattacherjee (2001) to support certain assertions in their research. The second group of articles that was identified involved papers such as Balijepally et al. (2009), Dang et al. (2012), Ho et al. (2011), Hsieh et al. (2012), and Kim et al. (2009). They adopted some of the constructs of the model; however their dependent variable was not

"continuance intention" (CI). Lastly, along the lines of this study, the third category of research papers involved articles that focused on "continuance intention" as the dependent variable and aimed at extending the full model or a subset of it (e.g. Benlian et al., 2011; Deng et al., 2010; Schwarz et al., 2011; Zhou et al., 2012).

The following section presents the research model by combining the two bodies of literature presented above.

3 Model development and hypotheses

Figure 3 presents the research model. It integrates dependency into the IS continuance model by hypothesizing that the level of dependency towards a ubiquitous media system inflates the perception of positive attributes (perceived usefulness and perceived ease of use) as well as the cognitive appraisal about the discrepancies between initial expectations and post-use performance (confirmation) (Ball-Rokeach, 1985; Bhattacherjee, 2001; Stafford et al., 2010, Turel et al., 2011).

The combination of both theories results into asserting that the pre-acceptance phase of a ubiquitous media system - characterized by initial expectations (t1) and perceived performance (t2) according to ECT - is followed by a cognitive appraisal of the expectation performance discrepancy (confirmation). Both confirmation and dependency have an influence on usage-related behaviors.

In line with Bhattacherjee's (2001) argument, it is posed that the pre-acceptance variables are already captured within the confirmation and satisfaction constructs of the ECT model. In addition, the IS continuance model captures expectations by using perceived usefulness (Davis, 1989) relying on the assumption that it is the only belief that impacts user intention at various temporal stages of IS use (Bhattacherjee, 2001). As a result, the constructs from the IS continuance model and their associated hypotheses (H_2, H_3, H_5) are preserved from the original model.

The notion of integrating perceived ease of use within the IS continuance model has been recently promoted as a way of capturing another facet of users' expectations toward IT artifacts. Perceived ease of use has been demonstrated to positively affect continuance usage intention in a broad range of contexts (Islam and Mäntymäki, 2011; Liao et al., 2007, Chiu and Wang, 2008, Roca and Gagné, 2008; Hong et al. 2006; Thong et al., 2006; Hsieh and Wang, 2007; Recker, 2010). Therefore, the following hypothesis is proposed:

> H_{4b}: The level of perceived ease of use when using a ubiquitous media system has a positive effect on the continuance intention to use the system.

There is also some evidence emerging from the literature that confirmation has a positive effect on perceived ease of use (Liao et al., 2007; Sorebo and Eikebrokk, 2008; Hong et al., 2006; Thong et al. 2006; Roca et al., 2006). As a consequence, hypothesis 2b was derived:

> H_{2b}: The level of confirmation resulting from usage experiences with ubiquitous media system has a positive effect on the level of perceived ease of use.

There is also some indication of a positive link between perceived ease of use and satisfaction (Chen et al., 2009; Islam and Mäntymäki, 2011; Liao et al., 2007; Hong et al., 2006; Recker, 2010; Thong et al., 2006). The following hypothesis is posed:

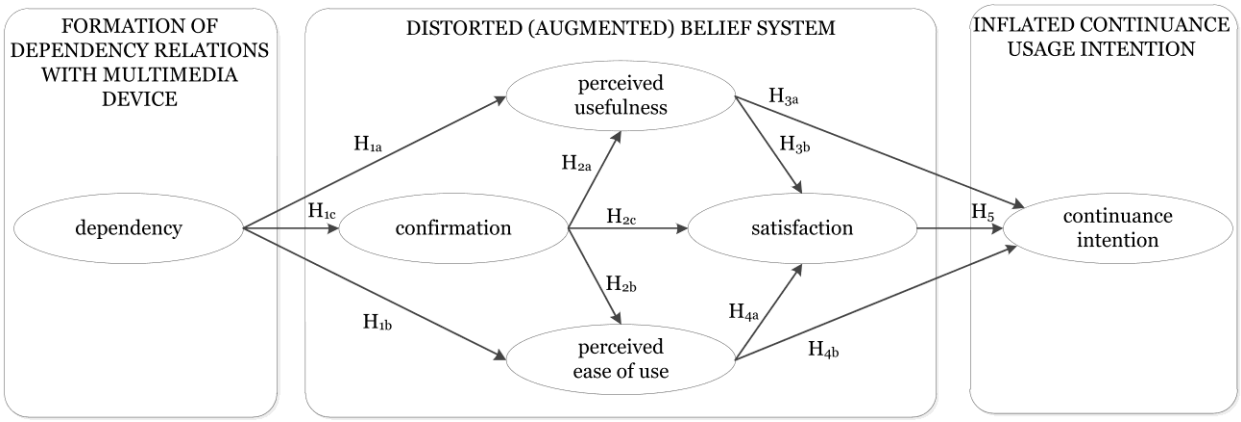

Figure 3. Research model

H_{4a}: The level of ease of use perceived from usage experiences with a ubiquitous media system has a positive effect on the level of satisfaction.

A high level of dependency towards a ubiquitous media system may lead to a confirmation bias (Nickerson, 1998), a term used in the psychology literature to refer to the erroneous seeking or interpreting of evidence in a way that allows to concur with given beliefs or expectations (Evans, 1989; Wason, 1959). In the case of a confirmation bias, only confirmatory evidence may be retained (while disconfirmatory evidence is omitted) when mentally assessing the extent to which a device has allowed to successfully fulfill an individual's needs (play, orientation, and understanding). In this research, it is posed that a high sense of dependency towards a given ubiquitous media system may have a distorting effect when individuals mentally assess the extent to which the system has satisfied their goal-oriented expectations and needs. High dependency may thus lead to magnifying positive experiences and minimizing (or omitting) negative ones, thus augmenting confirmation. As a result, it is hypothesized that:

H_{1c}: The level of dependency resulting from usage experiences with a ubiquitous media system has a positive direct effect on the level of confirmation.

Supporting Turel et al. (2011)'s findings on the relationship between technological dependency and IT usage behavior, a stream of IS research has investigated the influence of cognitive absorption which is defined as a state of deep involvement and enjoyment with an IT artifact on perceptions towards IT artifacts (Agarwal and Karahanna, 2000). It can be argued that cognitive absorption overlaps with the notion of dependency by considering that perceived enjoyment is related to the psychological dependency (thus addiction) towards an IT artifact while perceived involvement addresses the more goal-oriented facet of dependency (as defined in IMD). Cognitive absorption was found to both influence perceived ease of use and perceived usefulness (Roca et al., 2006; Saadé and Bahli, 2005; Zhang et al., 2006). Consequently, the following hypotheses were derived:

H_{1a}: The level of dependency resulting from usage experiences with a ubiquitous media system has a positive direct effect on perceived usefulness.

H_{1b}: The level of dependency resulting from usage experiences with a ubiquitous media system has a positive direct effect on perceived ease of use.

The next section presents the research methodology.

4 Research Methodology

This research adopts a positivist epistemology since it assumes an objective reality, examines causal relationships and attempts to test theory with the purpose to increase the predictive understanding of

phenomena (Babbie and Wagenaar, 1992; Mingers, 2003). The following subsections present the steps taken in operationalizing the model.

4.1 Operationalization of the constructs

The components of the IS continuance model were measured using scales provided by Bhattacherjee (2001) while the perceived ease of use was measured through a scale adapted from Davis (1989). Ubiquitous media system dependency was measured through the most commonly used dependency scale (Aydin et al., 1991; Ball-Rokeach et al., 1993; Grant, 1996; Loges, 1994). The set of items were adapted to the context of the research, which considered smartphone devices as instances of ubiquitous media systems. Due to restrictions on the length of this paper, Table 2 only presents the items related to ubiquitous media system dependency.

Ubiquitous media system dependency	Measurement items
The extent to which an individual's capacity to reach his or her objectives depends on the use of his/her ubiquitous media system *Source: Ball-Rokeach et al., 1984; Ball-Rokeach, 1985; Grant, Guthrie, and Ball-Rokeach, 1991.*	In your daily life, how useful/helpful is your smartphone to: **Self-understanding** ▪ Gain insight into why you do some of the things you do ▪ Imagine what you'll be like when you grow older ▪ Observe how others cope with problems or situations like yours **Social understanding** ▪ Stay on top of what is happening in the community ▪ Find out how the country is doing ▪ Keep up with world events **Solitary play** ▪ Unwind after a hard day or week ▪ Relax when you are by yourself ▪ Have something to do when nobody else is around **Social play** ▪ Give you something to do with your friends ▪ Have fun with family or friends ▪ Be a part of events you enjoy without having to be there **Action orientation** ▪ Decide where to go for services such as health, financial, or household ▪ Figure out what to buy ▪ Plan where to go for evening and weekend activities **Interaction orientation** ▪ Discover better ways to communicate with others ▪ Think about how to act with friends, relatives, or people you work with ▪ Get ideas about how to approach others in important or difficult situations *Source: Rokeach, and Grube (1984), Grant, Guthrie, and Ball-Rokeach (1991), and Ball-Rokeach, Grant, and Horvath (1995), Grant (1996)*

Table 2: Items used to Measure Ubiquitous Media System Dependency

Since data were collected in Italy, the items had to be translated from English into Italian. Double-back-translation was carried out by two bilingual specialists (Brislin, 1986). Finally, an online questionnaire was created using Google form tool and pre-test was carried out to ensure clarity (Dillman, 2000).

4.2 Data collection

Data collection was conducted in November 2012 among visitors of the Zoological Gardens in Rome. Two researchers equipped with tablets randomly asked visitors if they were smartphone users, and if so, invited them to take the survey. The zoo was a convenient location, which provided an interesting

array of individuals using ubiquitous media systems. A total of 345 interview requests were made and 150 complete questionnaires were collected.

The gender distribution of the sample balanced. The majority (45%) were 20-29 years old, while 33% were 30-39 years old. In regards to occupation, 59% of the respondents were currently employed, 29% were students, and 12% were unemployed or pensioners. Interestingly, 49% of the sample had a smartphone for less than 1 year. On average, respondents indicated that they used their device for about 3.5 hours per day. In addition, 64% used their device mainly for accomplishing personal rather than work purposes. Apple and Samsung were the two most common device brands (34.7% and 37% respectively).

4.3 Instrument validation (validation of the measurement model)

A Partial least squares (PLS) approach was implemented (using SmartPLS 2.0) to analyze the data. The main objective of PLS analysis is to maximize the explained variance of a model's endogenous constructs (Hair et al., 2011). PLS has gained increasing popularity in IS research for its ability to model complex latent constructs (with a high number of items or for second/third order constructs) with small sample sizes and under non-normality conditions (Chin, 1998; Ringle et al., 2013). Due to the relatively small sample size (150 responses) and the non-normality of some of the measures, PLS appeared as the most appropriate technique for conducting the analysis in this study.

In PLS, a structural equation model consists of 2 models (Hair et al., 2011; Wetzels, 2009). The outer model (or measurement model) specifies the relationships between the constructs and their associated indicators. The inner model (or structural model) connects the various constructs together. In PLS, the evaluation of the outer model must be first performed before an inner model can be legitimately assessed (Chin, 1998; Henseler et al., 2009).

Dimensionality of ubiquitous media system dependency

Since the original scale for media system dependency was developed to capture television dependency, it was important to investigate the extent to which the six initial dependency dimensions were relevant to this research context (Ball-Rokeach et al., 1993). Previous research such as Bigné Alcañiz et al. (2006) used the scale to measure television dependency and teleshopping dependency and questioned the dimensionality of the construct. They concluded that television dependency consisted of three dimensions: Self-understanding / orientation (10 items), social understanding / individual entertainment (4 items), social entertainment (2 items); while teleshopping dependency was comprised of two dimensions: basic information aspects (3 items) and further information aspects (9 items). Mafé and Blas (2006) used the same scale to assess internet dependency and found through an exploratory factor analysis that the construct consisted of four dimensions: entertainment and relaxation (six items), searching for guides to behavior and understanding (5 items), searching for information to take decisions (3 items), and searching for information to keep up to date and to use in communication (2 items).

In order to investigate the dimensionality of the ubiquitous media system dependency construct, exploratory factor analysis techniques (with varimax rotation) were used resulting into a 4-factor structure explaining 72.2% of the total variance. It was decided to adopt a factor loading and cross-loading threshold of .50 for factor loadings and .40 for cross-loadings, following recommendations from Straub et al. (2004) and Straub (1989).

Five items had cross-factor loading issues and had to be removed: AO1, AO2, AO3, SoP1, and SoP2. The final exploratory factor analysis resulted into a clean 4-factor solution explaining 79.5% of the total variance (see Table 3). Three factors corresponded to the dimensions of social understanding, interaction orientation, and solitary play. The fourth dimension corresponded to three items from self-understanding and one item from social play. A careful semantic analysis of the four items was

performed and it was noted that the item in question had an introspective connotation and therefore did belong within self-understanding.

	EFA				Outer model evaluation tests				
Item	Factor 1	Factor 2	Factor 3	Factor 4	Mean	Std	Loading	Reliability	AVE
SoU1				**.543**	3.23	1.44	0.75***	α = 0.83 CR = 0.90	0.75
SoU2				**.942**	3.13	1.47	0.92***		
SoU3				**.950**	3.10	1.48	0.92***		
IO1			**.864**		2.68	1.56	0.87***	α = 0.86 CR = 0.92	0.78
IO2			**.875**		2.11	1.40	0.91***		
IO3			**.730**		2.12	1.42	0.87***		
SolP1		**.907**			3.00	1.39	0.95***	α = 0.93 CR = 0.96	0.88
SolP2		**.907**			2.99	1.42	0.95***		
SolP3		**.877**			3.27	1.42	0.92***		
SocP3	**.614**				1.78	1.16	0.78***	α = 0.86 CR = 0.91	0.71
SeU1	**.795**				1.53	1.08	0.86***		
SeU2	**.875**				1.38	0.90	0.87***		
SeU3	**.792**				1.71	1.14	0.85***		
Kaiser-Meyer-Olkin measure of sampling adequacy = 0.819 / Bartlett's test of sphericity χ^2= 1445, df = 78, p=.000					*** p < 0.001 ** p < 0.01 * p< 0.05				

Table 3. Dependency - Exploratory factor analysis and scale validation results

Validation of the measurement scales

Internal consistency was assessed using Cronbach's alpha coefficients and composite reliability using a 0.70 threshold (Chin, 1998; Nunnally, 1978). Individual item reliability was assessed by examining the loadings of the measurement items (using a bootstrap procedure with 5000 resamples) with their respective construct (Hair et al., 2011; Hulland, 1999). A common rule of thumb is to retain the items which loadings are greater than 0.707 (Gefen and Straub, 2005; Straub et al., 2004). Construct convergent validity was evaluated for each construct by looking at Average Extracted Variance (AVE), with a threshold value of 0.50 (Chin, 1998; Wetzels, 2009). Finally, construct discriminant validity was evaluated via Fornell–Larcker criterion (Fornell and Larcker, 1981) and item cross-loadings (Hair et al., 2011; Hulland, 1999).

Tables 4 and 5 present the results of the outer model validation phase. All Cronbach's alpha and composite reliability coefficients were above 0.7. Individual item reliability was satisfactory for all constructs as all item loadings were above 0.707 with the exception of CI3 which had a loading slightly less than the threshold (0.68) but significant. The item was eventually retained as its loading was very close to the threshold and because the composite reliability of the construct decreased when the item was omitted (Chin, 1998, Hair et al., 2011). All constructs' AVE values were highly above 0.5 indicating good levels of construct convergent validity. The assessment of construct discriminant validity did not raise any concern since all the item loadings were higher in their respective construct than with any of the other constructs. Meanwhile, the square root of the AVE of each construct was found to be greater than the correlations of the construct with the other constructs.

Once the measurement model validated, the next step was to test the structural model and its associated hypothesized relationships. The results are presented in the following section.

5 Results

The degree to which the variance explained in a PLS model is maximized is determined through the examination of the R^2 measures associated with all the dependent (or endogenous) constructs (Chin, 1998; Hair et al., 2011; Hulland, 1999). The model explained 24% of the variance of continuance usage intention, and respectively 48%, 16%, and 13% for satisfaction, perceived ease of use, perceived

usefulness, and confirmation. Researchers have recently encouraged the use of a global goodness-of-fit (GoF) criterion to evaluate the quality of a model in PLS (Tenenhaus et al., 2005). The model was found to have a GoF of 0.41 indicating a high quality model. Indeed, Wetzels (2009) recommends to use GoF baseline values of GoF_{small}=0.1, GoF_{medium}=0.25, and GoF_{large} =0.36.

	Item	Mean	Std.	Loading	Reliability	AVE
confirmation	CF1	3.65	1.1	0.92***	α = 0.89	0.82
	CF2	3.64	1.07	0.94***	CR = 0.93	
	CF3	3.67	1.10	0.85***		
perceived usefulness	PU1	4.47	0.94	0.87***	α = 0.92	0.72
	PU2	4.27	1.10	0.82***	CR = 0.94	
	PU3	4.43	0.92	0.85***		
	PU4	4.07	1.14	0.83***		
	PU5	4.40	0.91	0.91***		
	PU6	4.38	0.89	0.81***		
perceived ease of use	PEU1	4.35	1.06	0.91***	α = 0.89	0.76
	PEU2	4.04	1.33	0.91***	CR = 0.93	
	PEU3	4.34	1.056	0.92***		
	PEU4	4.01	1.21	0.73***		
satisfaction	ST1	4.00	0.92	0.94***	α = 0.96	0.89
	ST2	3.91	0.94	0.96***	CR = 0.97	
	ST3	3.89	0.98	0.93***		
	ST4	3.97	0.91	0.94***		
continuance intention	CI1	4.48	0.86	0.91***	α = 0.79	0.71
	CI2	4.17	1.08	0.91***	CR = 0.88	
	CI3	3.37	1.16	0.68***		
					*** p < 0.001 ** p < 0.01 * p< 0.05	

Table 4. Measurement scale validation results

	dependency	confirmation	perceived usefulness	perceived ease of use	satisfaction	continuance intention
dependency	**0.67**					
confirmation	0.27	**0.90**				
perceived usefulness	0.26	0.31	**0.85**			
perceived ease of use	0.34	0.29	0.29	**0.87**		
satisfaction	0.34	0.58	0.51	0.38	**0.94**	
continuance intention	0.11	0.39	0.29	0.20	0.48	**0.84**

Table 5. Correlation among variables / square root of average variance extracted values

The path coefficients generated by PLS are used to confirm or reject the hypotheses associated with the conceptual model (Chin, 1998; Hulland, 1999). Chin (1998) argues that standardized paths should be at least 0.20 (and ideally above 0.30) so as to be considered meaningful. Besides, recent reviews of PLS analyses in social sciences research (Hair et al. ,2011; Ringle et al., 2012) have criticized the lack of consideration of a model's predictive capability and the absence of assessment of the paths' effect size. In response to such claim, both f^2 effect sizes and q^2 predictive relevance coefficients were calculated for each hypothesized path. Following recommendations from Cohen (1988), baseline

values of 0.02, 0.15, and 0.35 corresponding to *small*, *medium*, *large* levels, shall be used to assess both effect size and predictive relevance (Henseler et al., 2009).

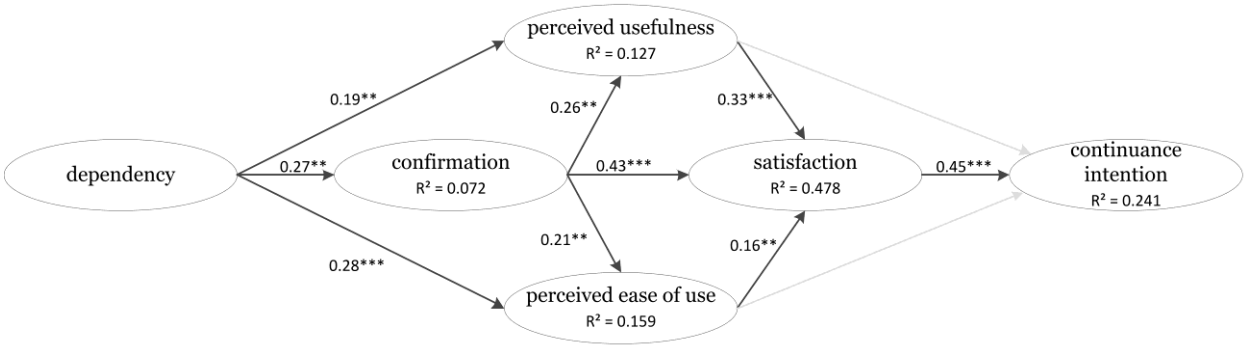

Figure 4. PLS analysis of the structural model

Nine out of the eleven hypotheses were supported (see Figure 4 and Table 6) with seven path coefficients above 0.20 and the other two being close.

The results demonstrated the positive effect of ubiquitous media system dependency on confirmation (path coefficient = 0.27**, f^2 = 0.17, q^2 = 0.11), perceived usefulness (path coefficient = 0.19**, f^2 = 0.04, q^2 = 0.02), and perceived ease of use (path coefficient = 0.28**, f^2 = 0.08, q^2 = 0.05). This finding answers the main investigation of this paper about the influence of dependency on the reasoned usage decisions through the distortion of beliefs and perceptions.

Confirming the original IS continuance model as well as more recent additions to the model, confirmation was found to be positively associated with satisfaction (path coefficient = 0.43***, f^2 = 0.31, q^2 = 0.24), perceived usefulness (path coefficient = 0.26***, f^2 = 0.07, q^2 = 0.04), and perceived ease of use (path coefficient = 0.21**, f^2 = 0.05, q^2 = 0.03). As expected, satisfaction was found to be strongly influencing continuance usage intention (path coefficient = 0.45***, f^2 = 0.08, q^2 = 0.06). The results did not confirm the existence of a positive effect of neither perceived usefulness or perceived ease of use on continuance intention to use.

Hypothesis	Path coeff.	f^2	q^2
H_{1a} DEP → PU	**0.19****	0.04	0.02
H_{1b} DEP → PEU	**0.28*****	0.08	0.05
H_{1c} DEP → CF	**0.27****	0.08	0.06
H_{2a} CF → PU	**0.26*****	0.07	0.04
H_{2b} CF → PEU	**0.21****	0.05	0.03
H_{2c} CF → ST	**0.43*****	0.31	0.24
H_{3a} PU → ST	**0.33*****	0.18	0.16
H_{3b} PU → CI	0.07		
H_{4a} PEU → ST	**0.16***	0.04	0.03
H_{4b} PEU → CI	0.01		
H_5 ST → CI	**0.45*****	0.17	0.11

Table 6. Final results

6 Discussion and Conclusion

The rapid transformation of mobile devices into complex multi-purpose, multi-context ubiquitous media systems has created an urgent need to revisit our understanding of mobile device usage through the lens of theories that encompass the multifaceted nature of ubiquitous systems. By combining Media System Dependency theory (Ball-Rokeach, 1998) with the IS continuance model (Bhattacherjee, 2001), this paper investigated the role of individual media dependency in predicting continuance intention to use ubiquitous media systems. A research model was developed and validated, shading some new light on the investigation of usage-related phenomena in the context of ubiquitous media systems.

The results confirmed the overall effect of ubiquitous media systems dependency on individuals' reasoned continuance usage decision. The findings suggest that the level of dependency towards a ubiquitous media system inflates the perceived positive attributes about the system, as well as the cognitive appraisal about the discrepancies between initial expectations and post-use performance. Furthermore, with regards to the valuation of the system's attributes, the level of dependency has a higher influence on perceived ease of use than into perceived usefulness. This result also yields that possibly there is a more significant relationship between dependency and the functional characteristics of the system (e.g. enabling use without effort) than in relation to its affordances (e.g. allowing an improvement of user performance or effectiveness). This insight could perhaps instigate a theme for future research.

Counter-intuitive results were found in regards to the absence of effects between both perceived usefulness/perceived ease of use and continuance intention to use. A first possible explanation resides in the nature of the mediating effect of satisfaction between PEOU/PU and continuance intention to use. The results may suggest the existence of a full mediation (as opposed to partial mediation). Some further investigation would be needed before confidently asserting such strong conclusion. Another possible reason, concurring with Zhang (2013), would be that affective variables may play a more important role than cognitive factors (see Ping Zhang, 2013) in the case of ubiquitous media systems.

Since this study is an initial stepping-stone towards understanding the importance of ubiquitous media system dependency on usage behavior, it provides a contribution to the IS literature. A logical continuation of this research project would involve the investigation of the factors that develop such strong relationships/dependencies between ubiquitous technologies and users. Indeed, this project has demonstrated that high dependency leads to a higher chance to prolonged usage. Understanding how to effectively generate such a high sense of ubiquitous media system dependency would be very insightful for researchers, users, and practitioners.

This research project has some obvious limitations. It is important to acknowledge that this study focused on only one type of device - smartphones. Investigating the stability of the results with a variety of ubiquitous media systems such as tablets and laptops would help to assess the extent to which the results can be generalized. The four-dimension structure of media system dependency found in this study, also deserves some further attention in order to evaluate whether the dimensional structure holds for various types of ubiquitous systems. Other limitations pertain to the nature of survey research. For instance, the results provide a snapshot picture of the influence of dependency and continuance usage intention. It is likely that the relationship between the two notions evolves over time. It could be argued that a longer initial use duration engenders a higher level of dependency towards a ubiquitous media system. Besides, the causality between the various constructs of the model was only inferred. One could for example argue that the direction of the link between dependency and confirmation could be reverse: the congruence between initial expectations and actual performance (confirmation) affects the level of dependency towards a given system. Longitudinal studies would help to carry on the investigation.

It is hoped that the advances made in this paper will stimulate further reflection about how the gradual transformation of mobile devices into ubiquitous media systems as well as the blurring of the separation between stationary and mobile information systems are engendering a major change into existing theoretical boundaries. As a result, there is an urging need to revisit the validity and applicability of the IT usage-related body of knowledge in IS research.

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